

Atlantic and New England coasts on the 14th, when this low area had passed to the northeast of New England.

VIII.—During the 18th the barometer was below the normal on the Pacific coast and the reports indicated the advance of a depression over the northern plateau region. These conditions immediately preceded the development of low area number viii. in Colorado on the morning of the 16th. The high area to the north of Colorado apparently forced this storm to the southeast until midnight of the 16th, when it was central in eastern Texas. During the southeasterly movement of this depression stormy weather continued on the Pacific coast, where the barometer continued decidedly below the normal. This storm was inclosed by an isobar of 29.9, including within its area the greater portion of the Mississippi valley, on the morning of the 17th. It moved slowly to the east attended by rain in all districts east of the Mississippi and snow in the northwest. The midnight report of the 17th exhibited two depressions—one on the middle Atlantic coast and one in the Ohio valley. The slight depression in the Ohio valley disappeared on the morning of the 18th, while the one on the middle Atlantic coast increased in energy and moved to the northeast, south of the coast line.

IX.—This disturbance approached from the Pacific, passing over Oregon and Washington Territory to Montana, where it was central at midnight of the 17th. It moved directly east to the upper Mississippi valley, where it was central at midnight of the 18th, forming a barometric trough which extended from Lake Superior to northern Texas. Warm east to south winds prevailed over the Southern states and Ohio valley, and cold north winds in the Missouri valley and on the eastern Rocky mountain slope. This barometric trough moved slowly eastward during the 19th, the centre of the depression passing to northern Illinois and Indiana at the morning and afternoon reports, respectively, and thence to the north near Alpena, Mich., at the midnight report. Violent gales occurred in the lake region, and the temperature fell 30° in eight hours in the central valleys, and destructive tornadoes occurred in the east Gulf and south Atlantic states on the afternoon and evening of the 19th. This was the most marked disturbance of the month. The barometer fell below 29.3 when the storm passed over the Saint Lawrence valley and New England and gales occurred on the Atlantic coast from Florida to Maine. The maximum velocities were: 60 miles, w., at Sandy Hook; 50, se., at Bird Rock; 49, w., at Provincetown; 52, sw., at Kitty Hawk.

X.—This disturbance also approached the stations from the north Pacific coast, where heavy rain occurred on the 19th sixteen hours previous to the appearance of this storm in Montana. The centre followed the general course of the Missouri valley, forming an extended trough of low pressure from the upper lake region to Indian Territory. The storm track crossed the Missouri river near Yankton, Dakota, and passed directly east to northern Illinois and thence over the lake region to the Saint Lawrence valley. This storm attained its greatest energy when central over the upper lake region, the winds at Milwaukee and Grand Haven reaching a maximum velocity of forty-two miles per hour.

XI.—The 3 p. m. report of the 21st indicated the advance of a low area from the region north of Montana, where the barometer had fallen rapidly during the day. The succeeding reports showed the advance of a low area north of Dakota and Minnesota during the 22d, the disturbance moving slightly to the south, causing high winds in the lake region. At midnight of the 22d this low area was north of Kingston and west of Quebec, the barometer being low to the southward and high in the west Gulf states. A secondary depression which has been traced as a continuation of number xi. developed on the middle Atlantic coast during the night of the 22d and this followed the coast line to the northeast. Strong gales attended the northeast movement of this secondary depression, the maximum velocities occurring after the winds shifted to the northwest. The following high velocities were reported: Sandy Hook and Cape Henry, 60 miles; Kitty Hawk, 56; Delaware Breakwater, 52; Eastport, 40; Boston, 34.

XII.—This was a slight but well-defined depression which was first observed in the lower Missouri valley on the afternoon of the 23d. It passed directly east until the afternoon of the 24th, reaching the Ohio valley, when it disappeared by a gradual rise of pressure over that region, which was probably due to the advance of a decided low area at that time central north of Dakota.

XIII.—The 3 p. m. report of the 24th showed a well-defined depression north of Minnesota, where the barometer had fallen more than .40 in eight hours, with high south to west winds in the extreme northwest and a rapid gradient to the south of the centre of disturbance. This storm moved to the southeast until it reached northern Michigan, but the pressure increased from 29.35 to 29.77 during the southeasterly movement. In passing over the lake region it lost much of its energy and after reaching the Saint Lawrence valley a secondary depression developed on the coast of Nova Scotia. This last depression increased in energy and caused violent gales off the northeast coast during the 27th and 28th.

XIV.—This storm developed in southern Texas on the 27th, immediately to the south of a cold wave which extended from the west Gulf states to British America. It was apparently forced to the eastward by the cold northerly winds, and at midnight of the 27th, three centres enclosed by isobars of 29.6 were observed in the barometric trough which extended from Lake Ontario to Florida. Warm southerly winds continued at stations on the Atlantic coast, while freezing weather with snow and sleet extended as far south as Tennessee. The 7 a. m. report of the 28th, exhibited a well-defined depression central on the middle Atlantic coast attended by severe gales. After the winds shifted to northwesterly on the North Carolina coast on this date, the wind reached a maximum velocity of sixty-four miles at Fort Macon, North Carolina, and marine reports from s. s. "D. J. Foley," in latitude N. 35° 51', longitude W. 75° 05', show that strong wnw. gales prevailed, the wind blowing with hurricane force for fifteen minutes at about 2.30 p. m. This storm increased in energy as moved north-eastward, the barometer falling to 28.6 at Yarmouth and 28.42 at Anticosti.

XV.—This low area was observed north of Dakota on the morning of the 29th. It moved almost directly south during the day, and at midnight it was well-defined and central in the lower Missouri valley, enclosed by an isobar of 29.6, almost circular in form, the barometer at the centre reading 29.56.

NORTH ATLANTIC STORMS DURING FEBRUARY, 1884.

[Pressure expressed in inches and in millimetres; wind-force by scale of 0—10.]

Chart ii. exhibits the tracks of the more important atmospheric depressions that have appeared over the north Atlantic ocean during February, 1884. The location of the various storm-centres has been approximately determined from reports of observations furnished by agents and captains of ocean steamships and sailing vessels, and from other miscellaneous data received at this office up to March 22, 1884.

The observations used are in general simultaneous, being taken each day at 7 a. m. Washington, or 12h. 8m. p. m. Greenwich, mean time.

Of the ten depressions charted six are continuations of disturbances which passed over, or near, the United States and Canada; and of those six, three have been traced eastward to the European coasts. Four depressions were first observed to the eastward of the fortieth meridian, one of these was a continuation of a storm shown on the chart for January. Fresh to strong southwesterly to northwesterly gales prevailed over the Atlantic throughout the month of February.

The following are brief descriptions of the depressions charted:

I.—This was a continuation of depression number xii. of the January chart. At the close of that month the disturbance was central to the southwestward of Ireland, and by February 1st it had reached the Channel. It then passed northeastward over England and the North sea. During its passage it caused

heavy gales in the English channel and Irish sea, and some damage on land.

II.—This was a continuation of the disturbance traced as low-area i., chart 1, of this REVIEW. During the 1st it passed over the Gulf of Saint Lawrence, and by the 2d it was apparently near N. 49°, W. 52°. It moved northeastward, and passed beyond the range of the observations on the 3d. During its passage, moderate to strong southwesterly gales prevailed between N. 45° and 52°, and W. 40° and 20°, with moderate westerly and northwesterly breezes to the westward of the centre.

III.—This was a continuation of low area iii. of chart i. On the morning of the 6th the disturbance was central over the Gulf of Saint Lawrence. It moved rapidly northeastward, causing fresh westerly gales between the Banks and the fortieth meridian, and strong southerly winds near W. 30°. By the morning of the 8th, this depression was central in about N. 55° W. 20°, at the same time a depression of considerable energy appears to have developed near N. 50°, W. 38°. On the 9th the disturbance was shown as a violent storm off the north-west coast of Ireland, closely followed, but at a lower latitude, by depression number iv. above referred to. Captain J. E. Dutton, commanding the s. s. "Sardinian," reported: "9th, 2 a. m., Greenwich mean time, wind ssw. fresh gale, barometer 29.01 (735.8), weather overcast. At noon (about N. 55° 13', W. 11° 59') wind shifted to w. moderate gale, sky clearing, barometer 28.86 (733.0); at 2 p. m., wind backed to sw. force 7, with heavy squalls and very heavy confused sea from ssw to w.; at 6 p. m. wind backed to ssw. force 7, barometer 28.73 (729.7); 7 p. m. wind sse. force 7, barometer 28.69 (728.7), sea becoming more confused. At 8.30 p. m., the wind fell light and veered to wsw. with very heavy westerly sea, barometer 28.55 (725.2); from this time until 11 p. m., the wind gradually freshened and blew a hurricane for about four hours during which time the barometer remained steady at 28.55 (725.2). High seas caused some damage to boats and deck fittings." Captain G. Moodie, commanding the s. s. "State of Georgia," reported: "9th, very stormy and unsettled weather; the barometer, which had been falling for the last thirty hours, reached its lowest reading at 8 p. m. (Greenwich mean time), when it read 28.14 (714.7), after which it began to rise, but very slowly. (Ship's position, lat. 55° 15' N., long. 14° 0' W.) Very heavy rain at times, during which the wind would veer to w. but soon backed to ssw. again with terrific sea from wsw. About midnight the wind came from wsw. with hurricane force; kept running before the gale all night and until 10 a. m. of the 10th, when I rounded ship, head to wind, and remained so for twelve hours before the gale moderated." On the 9th vessels on the fiftieth parallel and between W. 10° and 20° reported westerly winds of hurricane force throughout the day. On the 10th the two disturbances, having apparently united, were central as a deep depression of great energy off the western coast of Scotland, the lowest reported barometer reading being 28.33 (719.6). Strong sw. to w. gales prevailed over the British Isles, the North sea, and northern France.

IV.—The presence of this depression was well indicated on the morning of the 8th, near N. 50°, W. 35° to 40°, by the shifting of the wind to ssw. and sw. and the rapid decrease in pressure which had occurred, the barometer have fallen to 29.0 (736.6).

Captain Malet, commanding the s. s. "Marengo," reported: "8th, noon (N. 49° 48', W. 34° 05'), barometer 28.96 (735.6), hard sw. by s. gale, very high sea; 1 p. m., wind veering to wsw. with hard squalls and hail, force 8; 2 p. m., wind w. force 9, tremendous sea breaking heavily between squalls; 6 p. m., wind veered to wnw. in squalls of hurricane force, attended with hail; gale continued throughout the day, force 8 to 9."

On the 8th the s. s. "Iowa," S. Walters commanding, in N. 47° 43', W. 36° 11', had barometer 29.19 (741.4), wind wsw., force 7, cloudy weather and high w. sea, and on the same date the s. s. "Devonia," H. Young, commanding, in N. 51° 12', W.

34° 57', reported barometer, 29.22 (742.2), wind ssw., force 6, cloudy weather and heavy sw. swell. The disturbance moved northeastward, and as the barometric gradient rapidly increased to the westward, the westerly and northwesterly winds attained almost hurricane force, causing a very high westerly sea. The s. s. "Marengo," which was steaming to the westward reported: "on the 9th, (N. 49° 07', W. 35° 51') barometer, 29.68 (753.9), wind wnw., force 9; at 10 a. m. a heavy sea carried away star-board boats, rails, ventilators, funnel shrouds, etc.; at noon, wind decreasing, sea still high, squalls very violent; midnight, wind force 8, gale continued until noon of the 10th, wind nw. to wnw., force 7 to 8, with frequent squalls of snow and hail."

On the 9th the disturbance was central near N. 53°, W. 20°, the region between N. 42° and 56° and from W. 40° eastward to W. 10° was under the influence of the two disturbances, iii. and iv., and heavy gales prevailed over the area mentioned.

On the 9th the s. s. "Belgenland," J. Stokes commanding, reported: "on the 9th and 10th, between N. 47° 12', W. 26° 25' and N. 47° 55', W. 18° 47', encountered a heavy gale with snow and hail squalls, wind veering gradually from sw. to nw. and at times increasing to hurricane force; very heavy sea running, which stove in three boats, a life-raft, and did considerable damage about the decks." The s. s. "Anchoria," J. J. Small, commanding, in N. 51° 12', W. 28° 38', experienced a very heavy w. gale with terrific squalls of wind and hail, and heavy sea from nw., sw., and ene. Capt. H. C. Williams, commanding the s. s. "Oregon," in N. 49° 56', W. 24° 15', reported that some of the wind gusts were of hurricane force. In the above reports the barometer readings ranged from 29.0 (736.6) to 29.4 (746.7). Capt. C. Heblch, commanding the s. s. "Wieland," reported: "at 1 a. m. of the 9th, wind blowing very hard and barometer falling; at noon (Greenwich time), in about N. 50°, W. 22° 30', it read 28.73 (729.7), at which time the velocity of the wind (nw.) was almost that of a hurricane; at 4 p. m. the barometer began to rise."

Capt. S. Norvell, commanding the s. s. "British Crown," furnishes the following observations taken during the gale:

Date.	Time.	Barometer.		Wind.	Force, 0 to	Sea-swell.		Remarks.
		Inches.	Mill.			Character.	Direction.	
10.....	1.30	28.79	731.3	w.	7	heavy	west	Gloomy, threatening weather; lat. 50° 30' N., long. 19° 00' W.
10.....	3.38	28.71	729.2	w.	8	heavy	west	Gloomy, threatening weather; hove ship to.
10.....	7.30	28.74	730.0	w.	9	very heavy	west	Gloomy, threatening weather; kept ship before the sea; would not keep head on.
10.....	11.30	28.83	732.3	w.	10	mountainous	west	Gloomy, threatening weather; ship running before the sea.
10.....	15.00	29.19	741.4	w.	8	very heavy	west	Gloomy, threatening weather; ship running before the sea.
11.....	1.09	29.42	747.3	w.	7	heavy	west	Better appearance of the weather; lat. 50° 10' N., long. 14° 38' W.
11.....	4.10	29.46	748.3	w.	6	high	west	Sea going down; brought ship head to sea.

During the 10th, this depression probably merged with low area iii., which was then central north of the fifty-fifth parallel, and near the Scottish coast.

V.—This was a continuation of the disturbance charted as low area v., on chart i. It passed into the Atlantic during the 9th, and at midnight of that date, it was central southeast of Nova Scotia. On the morning of the 10th, the depression was near the southern part of the Banks, with the lowest barometer reading 29.64 (752.8); moderate s. and sw. winds prevailed between W. 50° and 40°. During the day the disturbance moved northeastward, with decreasing pressure at the centre, and appears to have overtaken and passed the s. s. "Llandaff City."

The following is furnished by Capt. T. L. Weiss, commanding that vessel:

Ship's date.	Ship's time.	Greenwich time.	Latitude N.	Longitude W.	Barometer.			Wind.		Remarks.
					Inches.	Millimetres.	Thermometer.	Direction.	Force, 0-10.	
10...	8 p. m.	h. m. 10.33 p. m.	46 38	38 34	29.20	741.7	48	sw.	6	Ugly, threatening weather; rain.
10...	12 p. m.	2.29 a. m.	46 44	37 46	28.95	735.3	48	sw.	8	Clear; high sea.
11...	4 a. m.	6.25 a. m.	46 54	36 45	28.70	729.0	42	w.	9	Heavy gale and sea.
11...	10 a. m.	12.25 p. m.	46 58	36 36	29.05	737.9	44	nw.	9	Hail and snow squalls.
11...	2 p. m.	4.26 p. m.			29.25	742.9	46	nw. by n.	9	Do.
11...	8 p. m.	10.26 p. m.			29.25	742.9	40	nw.	8	Do.
11...	12 p. m.	2.24 a. m.	47 22	36 28	29.25	742.9	38	nw.	8	Do.
12...	4 a. m.	6.22 a. m.			29.20	741.7	36	nw.	8	Do.
12...	8 a. m.	10.20 a. m.			29.20	741.7	38	nw.	7	Do.
12...	12 m.	2.17 p. m.	47 40	34 23	29.30	744.2	42	nw.	9	Very heavy squall.
12...	8 p. m.	10.12 p. m.			29.42	747.3		nw. by n.	7	At 11 a. m. a small whirlwind passed, travelling from ne. to sw.

The passage of this depression is shown in the report of the s. s. "Marengo," by the decrease of pressure which occurred on the 11th. After that vessel got clear of depression number iv., the barometer began to rise and the westerly wind decreased in force, but at 6 p. m., of the 10th, the wind hauled to the southward, with heavy sky and much rain, barometer (a) 28.76 (730.5), falling; 10 p. m., wind se., force 5, raining; midnight, wind sw., veering to wsw., force 6, barometer 28.56 (725.9), falling rapidly, sky clearing; ship hove to, head to ssw. (ship's position probably about N. 47° 30', W. 38°). At 2 a. m. of the 11th the barometer read 28.44 (722.4), falling, wind wsw., force 8, upper clouds moving rapidly, high irregular sea; 3 a. m., barometer 28.28 (718.3), steady, wind blowing a hurricane from wnw.; 6 a. m., hard nw. gale, squalls of great violence, attended by hail and snow, very high sea; 8 a. m., stove starboard gangways, wind wnw., force 9, stopped engines, ship driving to the se. under storm forestay-sail. At noon wind veered to nw. The gale continued, with slight variation in force or direction, until the 13th, when the barometer began to rise and the wind moderated. The ship's position was from N. 48° 45', W. 36° 19', on the 10th, to N. 46° 50', W. 39° 55', on the 13th.

Captain A. Jaeger, commanding the s. s. "Nürnberg," between N. 44° 19', W. 35° 33', and N. 47° 50', W. 21° 49', furnishes the following report:

Date.	Greenwich mean time.	Barometer.		Wind.		Remarks.
		Inches.	Mill.	Direction.	Force, 0-10.	
10.....	6.00 p. m.	29.90	759.7	ww.	4	Overcast, misty; high nw. swell.
10.....	10.00 p. m.	29.65	753.1	nw.	6-7	Increasing wind; high sw. and nw. swell.
11.....	2.00 a. m.	29.24	742.7	s. by w.	7-8	Misty, light rain; high sw. swell.
11.....	6.00 a. m.	29.08	738.6	w. by n.	7-9	Overcast, rain squalls; wind shifting at 4 a. m. to wsw.
11.....	8.00 a. m.	29.01	736.8	ww.	7-9	Overcast, misty; high sea from w.
11.....	9.00 a. m.	29.01	736.8	ww.	7-8	Do.
11.....	10.00 a. m.	29.03	737.3	w. by n.	7-8	Do.
11.....	2.00 p. m.	29.03	737.3	ww.	7-8	Overcast; hard storm; high sea from w.
11.....	6.00 p. m.	29.04	737.6	w.	7-8	Do.
11.....	10.00 p. m.	29.04	736.7	w.	7-8	Hard storm; heavy breakers from sw., w., and nw.; strong hail squalls and rain of short duration; lightning in se.
12.....	2.00 a. m.	29.00	736.6	w-ww.	7-8	Do.
12.....	5.00 a. m.	28.98	736.1	w-ww.	7-8	Do.
12.....	6.00 a. m.	28.99	736.3	w-ww.	7-8	Do.
12.....	10.00 a. m.	29.05	737.9	ww.	7	Less wind and sea; thunder and lightning in e.; barometer rising steadily.
12.....	2.00 p. m.	29.08	738.6	ww.	7	Do.

During the 11th and 12th the disturbance continued its northeasterly course with undiminished energy; the following reports of the steamers "Wieland," and "Sardinian," indicate

that those vessels encountered its greatest fury: The "Wieland," in N. 49° 18', W. 31° 15', at 11 a. m. (Greenwich time) of the 11th, reported barometer 28.12 (714.2) wind sw., force 10; the wind then shifted to nw. and blew a complete hurricane, accompanied by hail and snow, with very heavy sea. Captain Dutton, of the "Sardinian," reported as follows: "11th (about N. 53° 56', W. 18° 55'), highest reading of the barometer 29.19 (741.4), at 11.30 a. m. (Greenwich time), when it began to fall and the wind backed to se. by e., and at 5.30 p. m. it was blowing a whole gale, sky overcast, lightning in the sw. quarter. Just before sunset the sky cleared at the horizon, under the sun, and the clouds seemed to be rolling over and through each other, presenting a very wild appearance. At 6.30 p. m., wind se. by s., force 10, barometer 28.72 (729.5); 8.30 p. m., wind s. by w., force 10, barometer 28.67 (728.2); 11.30 p. m., barometer 28.61 (726.7), wind sw. by s., force 10. At 6.30 a. m. of the 12th the barometer reached its lowest reading, 28.38 (721.1); 9.30 a. m., wind wsw., force 10, barometer 28.44 (722.4). At noon (N. 53° 2', W. 21° 52'), gale moderating, barometer 28.59 (726.2), steadily rising." On board the s. s. "British Crown," on the 12th, in N. 49° 10', W. 18° 08', the barometer fell to 28.95 (735.3), but the wind, which was sw. by w., did not exceed force 7. By the 13th the disturbance was central off the northwest coast of Ireland, causing moderate gales over the British Isles and North Sea; the barometric pressure near the centre of disturbance, as reported by Captain Le Gallais, commanding the s. s. "Grecian," (about N. 55°, W. 12°) was 28.78 (731.0), wind ssw., strong gale, with hard squalls of hail and very vivid lightning.

VI.—This disturbance, which is noteworthy because of its slow eastward movement and the violence which it exhibited during its prevalence, was first observed near N. 40°, W. 35°, on the 13th. Captain Andreassen, commanding the bark "Cato," in N. 39° 45', W. 35° 40', reported as follows: "13th, at 10.30 a. m., Greenwich time, the barometer read 29.89 (759.2) and was falling rapidly (the decrease in pressure since the observation of the 12th was about .45 inch); the strong wsw. wind veered to sw., and continued with increasing force, accompanied by rain. At 2.30 p. m. barometer 29.26 (743.2), violent storm with dangerous sea; at the same time the wind suddenly shifted to nw. and blew with great fury, accompanied by hurricane-like squalls. The barometer then began to rise; at 10.30 p. m. it read 29.89 (759.2), but the wind continued to blow with unabating force until 6 a. m. of the 14th, when it gradually moderated to a strong breeze." During the 13th the disturbance moved northeastward with decreasing pressure and increasing energy, and by the 14th the region of least pressure was near N. 47°, W. 22°. Captain Weiss, commanding the s. s. "Llandaff City," which vessel was in the western semi-circle of the depression, furnishes the following: "During the 13th the glass was very low and the weather looked threatening, wind gradually hauling to ne., and increasing in force at midnight."

Ship's date.	Ship's time.	Greenwich time.	Latitude N.	Longitude W.	Barometer (a.).		Wind.		Weather.
					Inches.	Mill.	Direction.	Force.	
13th..	4 p. m.	5.54 p. m.	48 21	28 43	29.25	742.9	unsteady.	0-1	
"	8 p. m.	9.53 p. m.			29.20	741.7	nne.	6	Snow squalls.
"	12 p. m.	1.48 a. m.			29.10	739.1	ne.	5	Ugly; threatening.
14th..	2 a. m.	3.45 a. m.	48 29	26 15	28.90	734.0	ne.	8	Increasing gale.
"	4 a. m.	5.45 a. m.			28.72	729.5	ne.	9	Heavy gale.
"	6 a. m.	7.45 a. m.			28.58	725.9	nne.	10	Hurricane.
"	8 a. m.	9.45 a. m.			28.65	727.7	n.	10	Hurricane.
"	10 a. m.	11.45 a. m.			28.76	730.5	nww.	10	Hurricane.
"	12 m.	1.44 p. m.	48 41	25 03	28.92	734.6	nw.	10	Hurricane.
"	4 p. m.	5.44 p. m.			29.10	739.1	nw.	9	Slight abatement.
"	12 m.	1.44 a. m.			29.30	744.2	nw.	9	Sea rising.

"At 7 p. m. a very heavy sea broke on board, sweeping the decks fore and aft, consequently observations were not followed up during the night. During the height of the gale the sea was not so high. Owing to the immense pressure of the

wind the sea could not rise, but the air was one mass of spray, so that an object could not be seen at more than a few yards distance." Later, the "Llandaff City" fell in with the s. s. "Strathleven," disabled in N. 48° 22', W. 22° 12', that vessel having encountered a hurricane from southeast.

The s. s. "Sardinian," in about N. 50° W. 30°, at 2 a. m. of the 14th, had ne. wind of force 8, barometer 29.42 (747.3); 4 a. m., wind n. by e., force 8, barometer 29.17 (740.9); 6 a. m., wind n. by w., force 8, barometer 29.19 (741.4); 11 a. m., wind nw. by n., force 8, barometer 29.61 (752.1). After that time the wind gradually settled down to a strong breeze with steadily rising barometer. The following report of the s. s. "British Crown," shows that the storm-vortex passed over, or very near to that vessel.

Report of s. s. "British Crown," S. Norvell, commanding, (Greenwich date and hours):

Date.	Time.	Barometer (a.).		Wind.		Remarks.
		Inch.	Mill.	Direction.	Force 0-10	
14.....	h. m.					
14.....	1 38	29.38	746.2	wnw.	5	Cloudy, gloomy weather. Lat. 47° 20' N., long. 21° 42' W.
14.....	7 40	29.31	744.5	sw.	6	Cloudy, gloomy weather.
14.....	11 40	28.73	729.7	se.	7	Heavy rain; heavy se. sea; kept ship before it.
14.....	13 45	28.45	722.6	se.	9	Heavy rain; heavy se. sea; kept ship before it.
14.....	14 47	28.23	717.0	se.	10	Clearing; barometer falling rapidly.
14.....	15 48	28.03	711.9	se.	10	Hurricane; mountainous se. sea; fine, clear weather.
14.....	16 48	27.98	710.7	var.	1	Very high, confused sea; lowest barometer reading; wind shifting by s. to sw. and wnw.; fine, clear weather.
14.....	18 30	28.18	715.8	wnw.	10	Hurricane; very heavy, confused sea; ship not steering; going full speed; kept away before it.
14.....	24 00	28.73	729.7	wnw.	8	Heavy squalls.
15.....	1 45	28.93	734.8	wnw.	8	Heavy squalls; lat. 46° 41' N., long. 23° 05' W.
15.....	6 00	29.16	740.7	wnw.	7	Brought ship to wind and sea.

Very heavy s. to se. gales prevailed over the ocean eastward to W. 12°, while equally furious nw. gales prevailed to the westward of the twenty-second meridian.

The s. s. "Canada," J. Robinson, commanding, reported on the 14th, in about N. 49°, W. 14°, at 3 h., barometer 29.20 (741.9), wind se., force 10, cloudy weather, dangerous sea; 4 h., barometer 29.15 (740.4), wind s., force 10; 6 h., barometer 29.05 (737.9), wind s., force 9, gloomy, raining; 8 h. 30 m., barometer 29.15 (740.4), wind s., force 8; barometer gradually rising, with finer weather. The s. s. "Rhyndland," also appears to have been very near the centre of disturbance during the 14th, as shown by the following report furnished by Captain J. C. Jamison: "14th, midnight till 8 a. m., wind sse., increasing, barometer falling rapidly, heavy confused sea, squalls of rain and sleet, heavy lightning in the sw. and ssw., barometer at 8 a. m. 28.44 (722.4). From 8 a. m. till noon, violent gale from se. with steady rain, sky quite dark, very heavy sea from se., flooding decks fore and aft, barometer rising slowly, at noon 28.58 (725.9). From noon till 12.30, (about N. 49° 48', W. 24° 00'), wind suddenly moderating and flying about in all directions; at 12.30 the wind settled in the rfw. and blew with the same force as before, until 4 a. m. of the 15th. High sea breaking in all directions over the vessel, violent hail and snow squalls, lightning in the sse. and se., barometer at midnight, 29.52 (749.8)." The s. s. "America," which was on the same meridian (W. 24°), but about 2° farther south (N. 47°) than the "Rhyndland," at noon of the 14th, had barometer 29.06 (738.1), wind nw., force 10.

The disturbance moved slowly northward during the day, and on the 15th it was central near N. 50°, W. 18°; the strong se. and sse. gales continued to the eastward of the fifteenth meridian, and were accompanied by continuous rain. On the 16th a slight increase of pressure appears to have occurred over the ocean between the Irish coast and W. 20°, and during the 16th and 17th the depression was apparently forced to the westward and southward. The following reports indicate the

severity of the storm during those days: s. s. "Helvetia," J. W. Rogers, commanding, in N. 50° 36', W. 20° 46', on the 16th, reported: "noon, barometer 29.39 (746.5), falling, wind sw.; 9 p. m., wind veering suddenly to nw., barometer 29.32 (744.7), wind force 3; midnight, barometer 29.26 (743.2), wind varying from nw. to ne., force 4. 17th, 6 a. m., barometer 29.13 (739.9), wind nw., force 5, hauling to ene.; 8 a. m., barometer 28.89 (733.8), wind force 6; 10 a. m., barometer 28.76 (755.9), wind nne., force 7; noon, (N. 49° 38', W. 27° 03'), barometer 28.67 (728.2), wind n., force 8; 4 p. m., barometer 28.81 (731.8), wind n. by w., force 7; 6 p. m., barometer 28.88 (733.5) wind n., force 8, and squalls of force 9; midnight, barometer 29.27 (743.4), wind nnw., force 7, hail and snow squalls, barometer steadily rising and gale decreasing." Captain Robinson, commanding the s. s. "Canada," furnishes the following observations:

Date.	Time.	Barometer (a.).		Wind.		Sea-swell.	Weather.
		Inch.	Mill.	Direction.	Force 0-10		
16.....	h. m.						
16.....	14 00	29.30	744.2	ssw.	5	moderate	Cloudy.
16.....	15 00	29.10	739.1	se.	5	rough	Cloudy.
16.....	16 00	28.70	729.0	se.	5	rough	Cloudy.
16.....	19 00	28.32	719.3	se.	7	high; dangerous	Wind suddenly shifting to ne.; force 9; squally.
16.....	20 00	28.50	723.9	wnw.	8	tempestuous	Squally.
16.....	22 00	28.76	730.5	nw.	10	tempestuous	Fierce squalls.
16.....	24 00	28.82	732.0	nw.	10	very heavy	Heavy squalls; lat. 47° 11' N., long. 28° 33' W.
17.....	6 30	29.20	741.7	nw.	8	very heavy	Barometer slowly rising; gale moderating.

Captain Schoonhoven, commanding the s. s. "Daniel Steinhmann," reports as follows, (compass bearings true; ship's time): "February 17th, baffling winds, from 1 till 3 a. m., hazy sky and heavy swell from se.; 4 a. m., wind se., force 6, barometer 29.22 (742.2); 5 a. m., wind ese., force 7; barometer 29.12 (739.6); 6 a. m., wind e., force 6, barometer 28.87 (733.3); 7 a. m., wind ene., force 6, heavy rain, barometer 28.62 (726.9); 8 a. m., wind nne., force 2 to 3, barometer 28.50 (723.9); at 8.30 a. m., the wind suddenly broke out from n., force 10, causing in a few hours a very high sea, which compelled me to leave the ship to with head to the nne., no sky or horizon to be seen. At noon, latitude 47° 40', N. longitude 28° 3' W., wind n., force 10, (hurricane), barometer 28.37 (720.6)—this was the last reading; at 1 p. m., shipped a breaker, smashing chart-room, wheel-house, two life-boats, and partly filling the engine-room and stoke-hole; at 2.30 p. m., ship running before the storm and steering se., wind now nw. by n., force 10, with hurricane squalls of snow and hail; from 5 p. m. till midnight, wind moderating and sky breaking up." Captain T. Amlot, commanding the s. s. "Mentmore," reported: "17th, noon (N. 49° 10', W. 25° 59'), blowing a hard gale from se., with high sea; it fell calm for ten minutes, and the sea seemed to boil around the ship; the wind then burst out in a hurricane from nne.; at 2 p. m. the wind and sea were so terrific that we had to run the ship before it until midnight, wind having then hauled to nw., blowing a steady gale. The lowest reading of the aneroid during the calm was 28.40 (721.3); at 4 p. m. it began to rise gradually." During the 18th the disturbance apparently moved northeastward, retaining much of its violence, especially in the western quadrants. On the 19th it appeared off the southern coast of Ireland, but it displayed greatly diminished energy, although another storm had apparently formed to the westward.

VII.—On the 19th the wind shifted to southerly and a decrease of pressure occurred over the ocean between N. 45° and 55°, and W. 20° and 25°. The s. s. "Ohio," H. Morrison, commanding, in N. 50° 17', W. 23° 00', reported barometer 29.15 (740.4), wind sse., force 8, overcast; and the s. s. "France," Périet d' Hauterive, commanding, in N. 49° 15', W. 22° 48', barometer 29.39 (746.0), wind s., force 6, veering during the day to w., strong wind, rain and sleet and very high sea. During the 19th strong nw. gales continued between

W. 25° and 35°. By the 20th northwesterly winds prevailed on the fiftieth parallel, and from W. 25° to 20°, with the pressure about 29.35 (745.5). By the 21st the disturbance was off the western coast of Ireland, and during the 22d and 23d it moved northeastward to northern Scotland, the pressure near the centre being about 29.2 (741.7).

VIII.—This was a continuation of the depression charted as low-area viii. of chart i. During the 18th, it passed off the Atlantic coast to the southward of Nova Scotia, and during the 19th, 20th, and 21st, it moved eastward without exhibiting any great storm-energy and apparently filled up on the last-mentioned date.

IX.—This was a continuation of low-area xi., of chart i. During the 23d it moved up the Atlantic coast, developing considerable energy, as shown by the following reports: the ship "E. J. Spicer," Geo. D. Spicer, commanding, reported: "23d (in about N. 37° 30', W. 64° 30'), 8 p. m., Greenwich mean time, a gale began from s., accompanied by thunder, lightning, and heavy rain. From midnight of the 23d, until 3 a. m. of the 24th, it blew a hurricane, lowest barometer, 29.33, (745.0); after that, the wind moderated and hauled to the westward, and the barometer rose rapidly." The s. s. "Venice," in N. 37° 20', W. 64° 34', reported on the 23d, a hurricane from se. to sw. and nw., lasting twenty-three hours, vessel lost one boat and several sails. In N. 37°, W. 71°, the bark "Liberia" had a hurricane from se. to s. and w., lasting twenty-four hours, with thunder and lightning. Several other vessels reported heavy weather in the Gulf stream. By the 24th, the disturbance was near Cape Breton island, having combined with a disturbance (xi.), which had moved over the United States and Canada. Strong w. gales prevailed to the southward of Nova Scotia, while moderate southerly winds were reported to the eastward of W. 65°; by the 25th, the region of least pressure was between N. 45° and 50°, and W. 35° and 30°, over that region the barometer ranged from 29.4 (746.7) to 29.7 (754.4) with westerly winds near N. 45°, easterly to the northward of N. 50°, and southerly between W. 34° and 15°. The winds remained moderate in force in all quadrants of the depression during the 25th, but on the following day, they increased to a moderate gale. On the 27th, the disturbance was central near N. 52°, W. 27°, and during the 28th and 29th, it appears to have moved southeastward toward the Bay of Biscay.

X.—This was a continuation of the depression traced as low area xiii. on chart i. On the morning of the 27th the disturbance was central off the coast of Nova Scotia, having been joined by a subsidiary disturbance, which had moved up the Atlantic coast during the 26th, causing strong easterly gales near the fortieth parallel. On the 27th the s. s. "Pennland," R. Weyer, commanding, in N. 41° 20', W. 57° 16', reported barometer 28.91 (734.3); in the evening the wind set in from the se., with rain, veering through s. to wsw., heavy gale and confused sea. Captain T. Jüngst, commanding the s. s. "Rhein," reported: "27th to 28th, from N. 43° 7', W. 53° 48' to N. 42° 55', W. 56° 0', sw. storm with very high, dangerous sea; lowest barometer, 29.04 (737.6); heavy squalls, with hail. At midnight of the 27th the wind shifted from s. and sw. to nw." The disturbance moved northeastward, and on the 28th the storm-centre was near N. 48°, W. 42°, the lowest reported barometric reading being 29.21 (741.9). On the 29th, the disturbance was central near N. 50°, W. 35°, the pressure ranging from 29.2 (741.7) to 29.4 (746.7), with moderate w. and nw. gales to the westward.

OCEAN ICE.

Chart ii. also exhibits the southern and eastern limits of icebergs observed in the north Atlantic ocean during the month of February and up to March 12th. This chart is based on reports communicated by shipmasters to this office; reports furnished through the co-operation of the "New York Herald Weather Service," and other data published by the "New York Maritime Register."

During the period from February 14th to March 12th ice-

bergs have drifted southward as far as N. 42° and eastward to W. 43°. The most dangerous region, as indicated by the reports, extended from about N. 42° 50', W. 51° 00', northeastward to N. 45° 00', W. 46° 00'; within this area many immense ice-fields, studded with numerous large icebergs, were observed.

Compared with the chart for the preceding month (January–February), a marked change is observable, especially as regards the eastern limit of the ice-region. The southern limit is about 1° south of that for last month, it also extends farther westward and eastward; the eastern limit of the region has moved about 2° 30' east of that for January–February; at the same time the reports indicate a great increase in the size and number of both ice-fields and bergs.

A comparison with the chart for the same period in 1883 shows that, although there is no material change in the positions of the extreme southern and eastern limits of the ice-region, yet its southeastern corner reaches a lower latitude than in 1883. In that year most of the ice reported to the eastward of W. 47° was north of the forty-fifth parallel; this year the easternmost icebergs were observed to the southward of N. 44°.

Icebergs and field-ice were reported as follows:

February, 2d.—S. S. "Wyoming," from N. 45° 50', W. 48° 22', to N. 45° 07', W. 48° 51', passed through large quantities of field-ice.

4th.—S. S. "State of Georgia," in N. 45° 16', W. 48° 13', came up with several large patches of loose field-ice which extended n. and s. as far as could be seen from the topsail yard. It extended eastward to N. 45° 23', W. 47° 24'.

13th.—S. S. "Daniel Steinmann," in N. 45° 16', W. 44° 22', passed near a very large iceberg.

14th.—S. S. "Wieland," in N. 46° 50', W. 43° 45', passed a large iceberg.

15th.—S. S. "Wieland," in N. 45° 44', W. 47° 43', passed through several fields of floating ice.

16th.—S. S. "Rhynland," between N. 45° 12', W. 46° 58', and N. 44° 00', W. 48° 50', passed a number of icebergs, some quite large; also, in N. 44° 22', W. 48° 25', passed quantities of light field-ice. S. S. "Marengo," in N. 44° 18', W. 48° 40', passed three icebergs and a quantity of field-ice; many seals were seen; vessel steamed s. for two hours into open water.

17th.—S. S. "Brooklyn City," in N. 43°, W. 48°, fell in with field-ice and had to steer sse. for twelve hours to clear it. S. S. "Frisia," in N. 44° 04', W. 49° 05', passed rough field-ice. S. S. "Sardinian," entered loose field-ice in N. 44° 23', W. 48° 48'; cleared it in N. 43° 35', W. 49° 00'.

18th.—S. S. "Wisconsin," in N. 43° 47', W. 48° 33', passed an iceberg about five hundred feet long and thirty feet high; also a quantity of field-ice.

19th.—S. S. "Amerique," in N. 44° 05', W. 51° 30', passed five icebergs. S. S. "Richmond Hill," in N. 43° 41', W. 46° 31', passed a large iceberg and saw several others, together with much field-ice.

20th.—S. S. "City of Richmond," in N. 43° 10', W. 48° to 49°, sighted seven icebergs, one about two hundred feet long and about thirty feet high. S. S. "Egyptian Monarch," in N. 43° 52', W. 48°, passed nine icebergs and much drift ice. S. S. "Grecian," in N. 44° 25', W. 46° 12', passed a very large flat iceberg. S. S. "Salier," between N. 44° 56', W. 47° 51', and N. 43° 40', W. 49° 45', passed numerous icebergs and immense ice-fields. S. S. "Republic," in N. 44° 15', W. 46° 11', passed two pieces of ice.

21st.—S. S. "Adriatic," in N. 43° 39', W. 49°, passed four icebergs and a quantity of field-ice. S. S. "Edam," in N. 43° 40', W. 47°, passed many icebergs and much field-ice. S. S. "State of Nebraska," in N. 43° 52', W. 45° 26', passed a very large iceberg.

22d.—S. S. "Arizona," in N. 42° 54', W. 49° 20', passed three icebergs, each about forty feet high and four hundred feet long.

23d.—S. S. "France," in N. 44° 27', W. 45° 59', passed two icebergs. S. S. "Assyrian Monarch," in N. 42° 45', W. 49° 35', passed three icebergs, and a few miles farther west passed a

quantity of field-ice. S. S. "Hohenstaufen," from N. 43° 28', W. 48° 26', to N. 42° 56', W. 49° 25', passed through large fields of ice and saw several icebergs. S. S. "Ohio," in N. 44° 40', W. 45° 40', saw an iceberg; at midnight fell in with field-ice, and got clear of it on the 24th in N. 42° 36', W. 50° 00'. S. S. "Gloucester," in N. 44° 02', W. 47° 18', sighted numerous icebergs and field-ice; steamed southward, and on the 24th was surrounded by field-ice; had port bow damaged. Bark "Geo. Peabody" was abandoned in the ice in N. 42° 22', W. 48° 57', with bows stove and rudder damaged. S. S. "Circassian," in N. 43° 50', W. 46° 05', passed a large quantity of field-ice; to the northward the ice appeared closely packed, with several large bergs amongst it.

24th.—S. S. "Ohio," in N. 42° 30', W. 51° 00', passed an iceberg about seventy-five feet high and a quarter of a mile long. S. S. "Circassian," in N. 43° 21', W. 47° 17', passed a large iceberg; in N. 43° 10', W. 49° 06', met light field-ice, and in N. 42° 20', W. 51° 00', sighted an iceberg to the northward.

25th.—S. S. "California," in N. 42° 05', W. 49° 45', passed an iceberg and some field-ice. S. S. "Wieland," in N. 42° 13', W. 50° 20', passed some field-ice.

26th.—S. S. "State of Alabama," in N. 44° 13', W. 48° 56', fell in with large quantities of field-ice, which extended to N. 42° 31', W. 49° 31'; also passed several icebergs. S. S. "Serbia," in N. 43° 14', W. 48° 13', passed several icebergs and much field-ice. S. S. "Pennland," from N. 43° 34', W. 48° 37', to N. 42° 10', W. 50° 36', passed six icebergs and large fields of ice. S. S. "Rhein," in 44° 25', W. 45° 37', passed a large iceberg; also in N. 43° 53', W. 48° 40', passed fifteen others; in N. 43° 45', W. 49° 10', met an enormous field of ice—could not see open water; the field was about thirty-six miles in length.

27th.—S. S. "Azalea," in N. 47°, W. 44°, passed several icebergs.

28th.—S. S. "Norseman," at Boston, reported that from N. 43° 30' to N. 42°, and from W. 47° to W. 50°, she steamed along a solid wall of ice for a distance of one hundred and ten miles; at the same time a large number of icebergs were in sight, extending as far as the eye could reach; some of the bergs were apparently one hundred feet high. S. S. "Baltic," in N. 43° 32', W. 47° 54', passed an iceberg. Bark "Cuba," in N. 42° 33', W. 51° 00', passed twenty-five icebergs.

29th.—S. S. "Baltic," in N. 42° 42', W. 50° 34', passed a very large iceberg; also in N. 42° 36', W. 51° 12', passed several large bergs. S. S. "Catalonia," between N. 42° 35', W. 50° 20', and N. 42° 27', W. 51° 32', passed several icebergs and a large ice-field. S. S. "Labrador," in N. 42° 30', W. 50° 20', passed a number of icebergs and large fields of ice. S. S. "Lord Gough," in N. 43°, W. 47°, passed five icebergs.

March, 1st.—S. S. "Azalea," in N. 42°, W. 50°, passed several icebergs.

2d.—S. S. "Pavonia," between N. 42° 12', W. 50° 20', and N. 42° 05', W. 50° 54', passed seven icebergs. S. S. "Persian Monarch," in N. 44° 09', W. 45° 00', passed a number of icebergs. S. S. "Abyssinia," from N. 42° 50', W. 48° 00', to N. 42° 30', W. 52° 10', passed from sixty to seventy large and small icebergs and many detached pieces of ice.

3d.—S. S. "Geiser," in N. 43°, W. 52°, saw about twenty icebergs. S. S. "Rialto," between N. 44° 24', W. 47° 02', and N. 43° 29', W. 50° 50', passed many icebergs.

S. S. "Main," between N. 44° 33', W. 45° 08', and N. 42° 24', W. 51° 25', passed a large number of icebergs and an ice-field about two miles long and twenty feet high; also several pieces of ice.

5th.—S. S. "Clintonia," in N. 45° 15', W. 45° 30', passed five icebergs.

6th.—S. S. "Britannic," in N. 42° 16', W. 48° 03', passed an iceberg about seventy feet high and two hundred and fifty feet long; also in N. 42° 06', W. 50° 13', passed two small bergs. S. S. "The Queen," between N. 42° 52', W. 48° 08', and N. 42° 45', W. 48° 55', passed several large icebergs and

a quantity of small ice. S. S. "Clintonia," in N. 43° 28', W. 50° 30', passed four large icebergs.

7th.—S. S. "Gallia," in N. 44° 00', W. 43° 30', passed an iceberg; also fifteen miles farther west passed a quantity of field-ice.

8th.—S. S. "Gallia," in N. 42° 34', W. 47° 23', passed an iceberg; also in N. 42° 10', W. 51° 25', passed another about twelve miles north of ship; also in N. 42° 08', W. 51° 51', passed three icebergs. S. S. "Furnessia," from N. 44° 26', W. 44° 15', to N. 44° 12', W. 44° 42', passed several small icebergs. S. S. "Italy," in N. 44° 20', W. 45° 40', passed several large icebergs. S. S. "Cornwall," between N. 43° 44', W. 47° 10', and N. 43° 20', W. 50° 18', passed a number of icebergs. S. S. "St. Laurent," in N. 44° 28', W. 46° 07', passed two icebergs; also in N. 43° 53', W. 48° 25', passed an ice-field.

9th.—S. S. "Italy," in N. 42° 35', W. 50° 22', passed two icebergs. S. S. "St. Laurent," in N. 43° 30', W. 50° 23', passed a small iceberg.

10th.—S. S. "Weser," at New York, reported, between N. 44° 30' and 42° 30' and W. 46° and 52°, passed numerous large icebergs. S. S. "Katie," in N. 43° 40', W. 44° 43', passed three icebergs, one of which was about forty feet and the others about thirty feet high.

12th.—S. S. "Grecian Monarch," in N. 42° 08', W. 50° 57', passed three icebergs.

TEMPERATURE OF THE AIR.

[Expressed in degrees Fahrenheit.]

The distribution of mean temperature over the United States and Canada, for February, 1884, is exhibited on chart iii. by the dotted isothermal lines.

In the following table are shown the normal temperatures for February, the mean temperatures for February, 1884, and the departures from the normal in the several geographical districts, as deduced from the records of the Signal Service:

Average temperatures for February, 1884.

Districts.	Average for February. Signal-Service observations.		Comparison of Feb., 1884, with the average for several years.
	For several years.	For 1884.	
New England	28.2	31.6	3.4 above.
Middle Atlantic states	35.9	40.5	4.6 above.
South Atlantic states	49.8	54.9	5.1 above.
Florida peninsula	62.4	66.0	3.6 above.
Eastern Gulf states	53.1	55.5	2.4 above.
Western Gulf states	52.6	54.3	1.7 above.
Rio Grande valley	63.6	65.6	2.0 above.
Tennessee	44.4	47.3	2.9 above.
Ohio valley	36.0	39.4	2.8 above.
Lower lake region	26.2	27.2	1.0 above.
Upper lake region	21.8	17.7	4.1 below.
Extreme northwest	11.2	— 1.1	12.3 below.
Upper Mississippi valley	29.5	26.5	3.0 below.
Missouri valley	25.0	16.4	8.2 below.
Northern slope	24.1	12.8	11.3 below.
Middle slope	34.1	31.2	2.9 below.
Southern slope	49.1	50.4	1.3 above.
Southern plateau	46.0	47.5	1.5 above.
Northern plateau	32.4	27.2	5.2 below.
North Pacific coast region	41.5	36.1	5.4 below.
Middle Pacific coast region	50.0	47.6	2.4 below.
South Pacific coast region	56.0	56.2	0.2 above.
Mount Washington, N. H.	6.2	14.1	7.9 above.
Pike's Peak, Colo.	3.4	2.6	0.8 below.
Salt Lake City, Utah	31.4	31.3	0.1 below.

A line of normal temperatures extends from Lake Huron in a southwesterly direction to northern Arkansas and central Indian Territory, thence in a direction slightly north of west to Salt Lake City, Utah, and thence southwestward to the southern California coast. North of the line mentioned, the mean temperatures were below the normal, and south of it they were above. The departures below the normal were more marked than those above—ranging from 9° to 12° in the extreme northwest, northern slope, and Missouri valley. In the districts where the temperatures averaged above the normal, the departures were greatest in the middle and south Atlantic states, where they were 4° 6 and 5° 1, respectively. The distribution of the mean temperatures of February, 1884,